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(71) Applicant  
**J. Young (Scientific Glassware) Limited**  
  
(Incorporated in the United Kingdom)  
  
**11 Colville Road, Acton, London, W3 8BS,  
United Kingdom**

(72) Inventor  
**James Young**

(74) Agent and/or Address for Service  
**Baron & Warren**  
**18 South End, Kensington, London,  
W8 5BU, United Kingdom**

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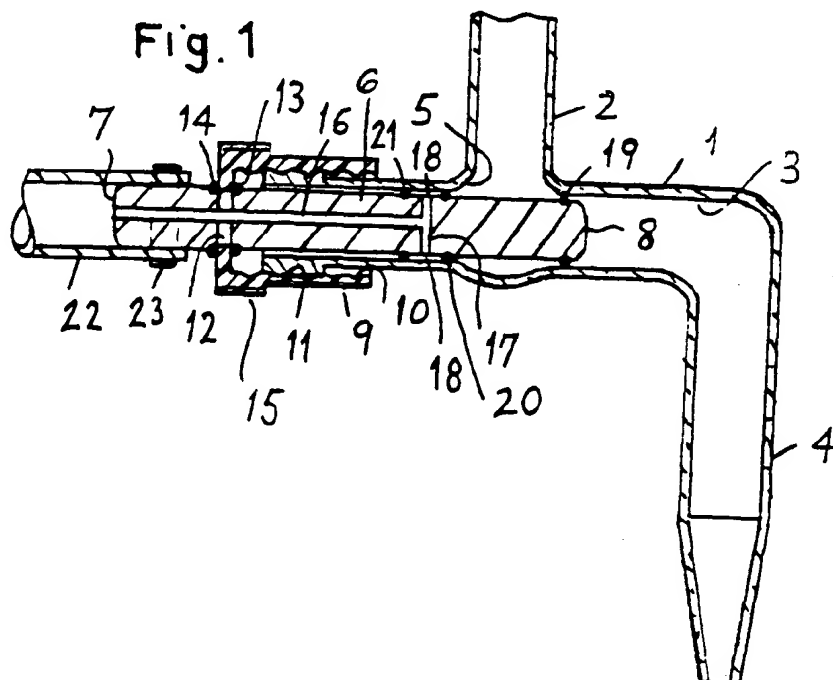
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(56) Documents cited  
**GB 2176268 A US 3608584 A US 3545479 A**

(58) Field of search  
**UK CL (Edition J) F2V VP12 VV4  
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## (54) Flow control valve

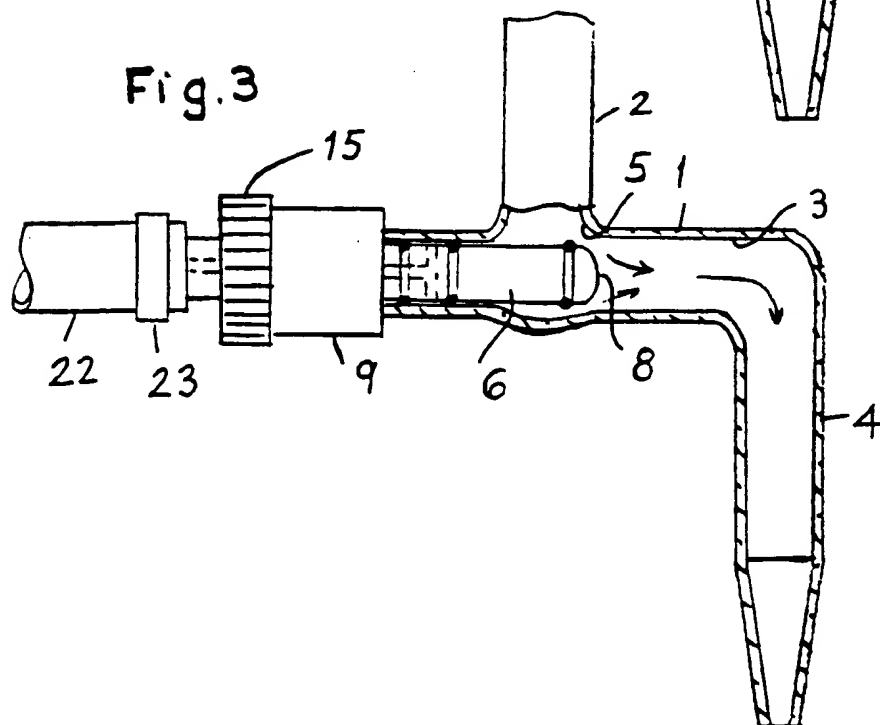
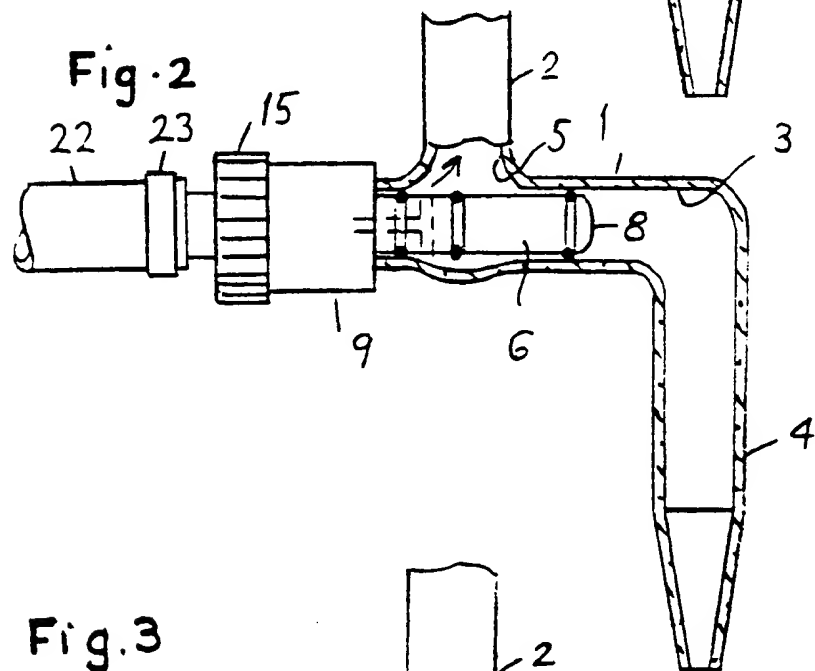
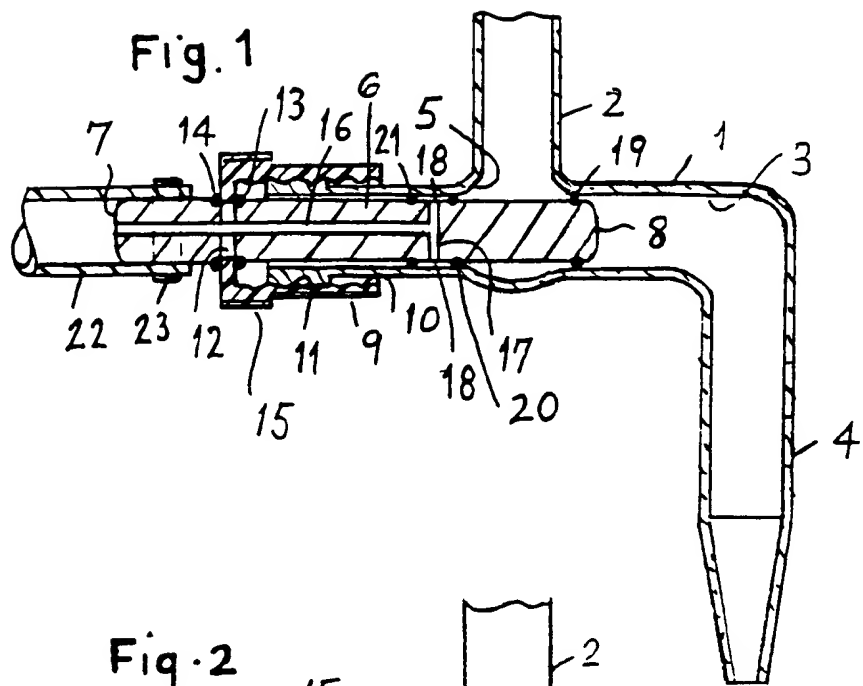
(57) A fluid flow control valve comprises a tubular valve body 1 having first and second ports 3, 5 and an axially adjustable valve plug 6 having a delivery passage 16 communicating with transverse ports 18. Sealing rings 19, 20, 21 on the valve plug provide for sealing engagement between the valve plug and body. Axial adjustment of the plug 6, without rotation, is controlled by a threaded control cap 9, whereby the valve plug is selectively adjustable to transfer fluid from a first receptacle connected to the end 7 of the plug to a second receptacle connected to the second port 5, to discharge fluid from the second receptacle via the second port 5 and the first port 3, or shut-off fluid flow through the valve.



The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1982

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IMPROVEMENTS IN FLOW CONTROL VALVES

The present invention relates to flow control valves for fluids and, more particularly, to such valves for use with laboratory, research and testing apparatus, for example, burettes and gas sample tubes.

5           In laboratory and testing procedures, which commonly use equipment made from glass, it is often necessary to be able to deliver fluid in a controlled manner from one receptacle, for example, a reservoir, to another receptacle, and thereafter to discharge fluid in a  
10           controlled manner from the latter receptacle, where different fluids may be mixed, to a subsequent step. Hitherto, the controlled delivery of fluid to the second receptacle and discharge therefrom has required the use of two simple valves or stopcocks, such as, two valves  
15           of the greaseless type described in our prior UK Patent Specification No. 1463303, or a single three-way valve utilising a greased, tapered valve plug. The former arrangement is expensive whereas, with the latter, there is a risk that fluids being conveyed through the  
20           valve will be contaminated with grease.

          It is an object of the present invention to provide a three-way fluid control valve or stopcock which avoids the disadvantages of these prior arrangements.

          To this end, the invention consists in a fluid flow  
25           control valve comprising a tubular valve body having a first port at one end of the body and a second port disposed between opposite ends thereof, a valve plug mounted in the valve body and having an outer end projecting from the end of the body opposite the first port  
30           and its opposite inner end extending across the second port, a control member mounted on the plug and in threaded engagement with the valve body, a delivery passage extending axially within the valve plug from the outer end thereof and communicating with at least one transverse  
35           port disposed in the plug at a position spaced from the

inner end thereof, and axially spaced sealing members located on the valve plug between the transverse port and the inner end of the valve plug, said valve plug being movable axially in the valve body, in response to turning of the control member, between a position in which the sealing members are engaged with the valve body on opposite sides of said second port to shut-off fluid flow through the delivery passage in the plug and the first and second ports in the valve body, a second position in which the valve plug is advanced to connect the transverse port in the valve plug to the second port in the valve body, and a third position in which the valve plug is retracted to interconnect the first and second ports of the valve body.

The delivery passage in the valve plug may be connected to a delivery tube, such as, a flexible rubber tube, which is fitted over the outer end of the valve plug. The valve body, itself, may be made from glass and may be formed integrally with the outlet of a fluid receptacle, such as, a burette, which outlet is connected to one of the ports of the valve body. In a preferred embodiment, the second port is connected to the outlet of the receptacle so that, when the valve plug is in its second position, fluid can be delivered from another receptacle to the first receptacle, via the delivery passage in the plug and the second port whilst, when the valve plug is in its third position, the first port is connected to the second port for discharge of fluid from the first receptacle.

The control member is preferably a cap rotatably mounted on the projecting outer end of the valve plug in a captive manner and having an internal thread in engagement with an external thread on the tubular valve body, thereby to enable the valve plug to be moved axially, without rotation, when the cap is turned. The threaded cap

enables the valve plug to be easily moved and is conveniently provided with a milled ring or outer surface to facilitate grasping by a user.

5 Conveniently, a sealing member is also located on the valve plug, on the side of the transverse plug port adjacent the outer end of the valve plug, and engages with the valve body to prevent leakage of fluid therefrom via its end housing the valve plug.

10 The valve plug may be made from PTFE and the sealing members may comprise O-rings made, for example, from a fluorocarbon elastomer, such as, that sold under the trade name of VITON. Alternatively, the sealing members may be constructed as described in our prior UK Patent Specification No. 2084669B.

15 In order that the present invention may be more readily understood, reference will now be made, by way of example, to the accompanying drawings, in which:-

20 Figure 1 illustrates an axial section through one embodiment integral with the outlet tube of a burette, the valve being shown in its shut-off position,

Figure 2 is a similar view illustrating the valve in its second position in which the delivery passage in the valve plug is connected to the outlet of the burette, and

25 Figure 3 is also a similar view illustrating the valve in its third position in which the outlet of the burette is connected to the outlet port in the valve body.

Referring to the drawings, the fluid flow control valve illustrated has a tubular valve body 1 made from glass which is integral with the outlet tube 2 of a glass  
30 burette. The valve body 1 extends transversely to the burette outlet tube 2 and has a first port 3 at one end connected to a discharge tube 4 and a second port 5 disposed between opposite ends of the valve body and integral  
35 with the outlet tube 2 of the burette. A valve plug 6,

which is preferably made from PTFE material, is mounted within the end of the valve body opposite its first port 3 so that an outer end 7 thereof projects from the valve body, whilst the plug has sufficient reach such that its opposite inner end 8 can extend across the second port 5. The valve plug is reciprocal within the valve body by means of a control member in the form of a cap 9 of plastics material adjustably mounted on the end of the valve body adjacent the outer end of the valve plug by means of an internal screw thread 10 engaging with an external thread 11 on the valve body. The valve plug projects through an aperture 12 in the cap, which is retained captive on the valve plug by PTFE O-rings 13,14 which allow the cap to rotate relative to the plug. To secure the cap to the plug, the O-ring 13 is pushed on to the lip of a recess (see Figure 1) and acts as a shoulder for the cap, which is slipped over the valve plug so that the edge of the aperture 12 fits into a recess, and then the O-ring 14 is slipped over the plug until it engages with the outside wall of the cap. By enabling the cap 9 to rotate on the valve plug 6, the plug can be moved axially in the valve body without rotating. A knurled ring 15 is formed on the external surface of the cap to facilitate turning of the latter.

The valve plug 6 has an axial delivery passage 16 which extends from the projecting outer end 7 thereof and communicates with a transverse passage 17 forming two diametrically opposite ports 18 at positions spaced from the inner end of the valve plug. Three sealing members 19,20,21 shown as O-rings, conveniently, of PTFE, are located on the valve plug so as to be in fluid-tight engagement with the inner wall of the valve body 1. Two of the sealing members 19,20 are located in axially spaced relation respectively, adjacent the inner end 8 of the valve plug and adjacent the transverse plug ports 18.

They are arranged so as to provide seals between the valve plug and opposite sides of the second body port 5 when the valve plug is poistioned so as to extend across the latter, as illustrated in Figure 1. The sealing member 21 is located adjacent the transverse ports 18 on the outside thereof to prevent leakage of fluid from the adjacent end of the valve body.

A flexible tube 22 is fitted to the outer end 7 of the valve plug and is secured by means of a suitable clip 23 for delivering liquid to the axial passage 16 in the valve plug.

In the position illustrated in Figure 1, liquid flow through the valve body 1 is shut-off. To permit liquid flow into the burette from the delivery tube 22, the cap 9 is screwed further on to the valve body so that the valve plug 6 is moved axially to disengage the sealing member 20 from sealing engagement with the valve body (see Figure 2), whereupon liquid flows into the burette via the axial passage 16, the transverse ports 18 and the second port 5. The liquid flow is shut-off by unscrewing the cap so as to return the plug to the position illustrated in Fig. 1. To discharge liquid from the burette via the first port 3 and the discharge tube 4, the cap 9 is unscrewed so as to move the valve plug 6 axially to disengage the sealing member 19 from sealing engagement with the valve body (see Fig. 3 ), whereupon liquid is discharged from the burette via the second port 5 and the first port 3. Discharge is shut-off by screwing the cap so as to return the valve plug 6 to the position shown in Fig. 1.

Whilst a particular embodiment has been described, it will be understood that modifications can be made without departing from the scope of the invention. For example, the sealing members 19,20,21 may be constructed as described in our prior UK Specification No. 2084669B.

CLAIMS

1. A fluid flow control valve comprising a tubular valve body having a first port at one end of the body and a second port disposed between opposite ends thereof, a valve plug mounted in the valve body and having an outer end projecting from the end of the body opposite the first port and its opposite inner end extending across the second port, a control member connected to the plug and adjustably engaged with the valve body, a delivery passage extending axially within the valve plug from the outer end thereof and communicating with at least one transverse port disposed in the plug at a position spaced from the inner end thereof, and axially spaced sealing members located on the valve plug between the transverse port and the inner end of the valve plug, said valve plug being axially adjustable in the valve body, in response to adjustment of the control member, between a first position in which the sealing members are engaged with the valve body on opposite sides of said second port to shut-off fluid flow through the delivery passage in the plug and the first and second ports in the valve body, a second position in which the valve plug is advanced to connect the transverse port in the valve plug to the second port in the valve body, and a third position in which the valve plug is retracted to interconnect the first and second ports of the valve body.

2. A fluid flow control valve as claimed in claim 1, wherein the delivery passage in the valve plug is connected to a delivery tube attached to the outer end of the valve plug.



3. A fluid flow control valve as claimed in claim 1 or 2, wherein the valve body is formed integrally with the outlet of a fluid receptacle, said outlet communicating with one of the first and second ports of the valve body.

4. A fluid flow control valve as claimed in claim 3, wherein the second port communicates with the outlet of the receptacle so that, when the valve plug is in its second position, fluid can be delivered from another receptacle to the first receptacle, via the delivery passage in the plug and the second port whilst, when the valve plug is in its third position, the first port is connected to the second port for discharge of fluid from the first receptacle.

5. A fluid flow control valve as claimed in any one of the preceding claims, wherein the control member is in threaded engagement with the valve body and the valve plug is axially adjustable in response to turning of the control member.

6. A fluid flow control valve as claimed in claim 5, wherein the control member is a cap rotatably mounted on the projecting outer end of the valve plug in a captive manner and having an internal thread in engagement with an external thread on the tubular valve body, whereby the valve plug is axially adjustable, without rotation, when the cap is turned.

7. A fluid flow control valve as claimed in any one of the preceding claims, wherein a sealing member is located on the valve plug, on the side of the transverse plug port adjacent the outer end of the valve plug, and engages with the valve body.

8. A fluid flow control valve as claimed in any one of the preceding claims wherein the valve plug is made from PTFE and the valve body from glass.

9. A fluid flow control valve as claimed in any one of the preceding claims, wherein the sealing members comprise O rings.

10. A fluid flow control valve constructed and adapted to operate substantially as hereinbefore described with reference to the accompanying drawings.

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## PATENTS ACT 1949

## SPECIFICATION NO 1409035

The following amendments were allowed under Section 29 on 19 January 1991

Page 2 Line 71    Page 4 Line 88 Delete a halogen atom or

THE PATENT OFFICE  
13 February 1991